Claims

The embodiments of an invention in which an exclusive property or right is claimed are defined as follows:

1. A method for sensing a moving member, the method comprising the steps of:

generating a variable magnetic field by the moving member; and

introducing a first bridge and a second bridge, each adjacent to the moving member, the first bridge and second bridge each comprising a first set of runners and a second set of runners, the first set of runners and the second set of runners being electrically influenced by the magnetic field and each bridge generating at least a direct facing relationship signal and a direct transitional relationship signal as the member moves; the second bridge being located a distance from the first bridge such that a phase difference exists between the signals of the two bridges.

2. The method of claim 1, the moving member further comprising at least a first magnetic orientation and at least a second magnetic orientation.

3. The method of claim 1, the first set of runners being approximately perpendicular to the second set of runners within each bridge.

4. The method of claim 3, the first set of runners further comprising a first set of resistive elements, the second set of runners further comprising a second set of resistive elements.

5. The method of claim 2, the first set of runners and the second set of runners further generating at least an indirect transitional relationship signal.

6. The method of claim 1, further comprising the step of introducing a computing means in communication with at least one of the first bridge and the second bridge.

7. The method of claim 6, the computing means determining the speed of the moving member.

8. The method of claim 1, the moving member moving rotationally.

9. The method of claim 8, the moving member moving linearly.

10. The method of claim 8, the computing means determining the rotational direction of the moving member based upon the first bridge signal's relationship to the second bridge signal.

11. The method of claim 10, the first bridge being a Wheatstone bridge, the second bridge being a Wheatstone bridge.

12. A product made according to the method of claim 1.

13. A method of forming a magnetic speed and direction detection device, the method comprising the steps of:

introducing a first set of runners and a second set of runners, configuring the first set of runners with the second set of runners as a first Wheatstone bridge, the first Wheatstone bridge configured to generate at least a first output signal in the presence of a variable magnetic field;

introducing a second Wheatstone bridge, the second Wheatstone bridge configured to generate at least a second output signal in the presence of the variable magnetic field; the second Wheatstone bridge located a distance from the first Wheatstone bridge; the distance being selected to create a phase shift between the first output signal and the second output signal.

14. The method of claim 13, the first Wheatstone bridge and the second Wheatstone bridge being fabricated as an integrated circuit.

15. The method of claim 14, further comprising the step of introducing a computing means in communication with the first Wheatstone bridge and the second Wheatstone bridge.

16. The method of claim 15, the computing means being fabricated on the integrated circuit.

17. The method of claim 15, further comprising the step of introducing a magnet array in proximity to the first and second Wheatstone bridges.

18. A product made according to the method of claim 16.

19. A product made according to the method of claim 17.

20. An apparatus to sense the speed and direction of a moving member having a magnetic field, the apparatus comprising:

at least a first set of runners and at least a second set of runners adjacent to the moving member, the first set of runners and the second set of runners configured as a first Wheatstone bridge, the first Wheatstone bridge configured to generate at least a first output signal as the member moves and as a magnetic field associated with the member electrically influences at least one of the first and second set of runners; and

the apparatus further comprising a second Wheatstone bridge located a distance from the first Wheatstone bridge, the second Wheatstone bridge configured to generate at least a second output signal as the member moves and in the presence of the magnetic field associated with the member; and the distance between the first and second Wheatstone bridge selected to create a phase shift between the first and second output signals.

21. The apparatus of claim 20, the first set of runners being approximately perpendicular to the second set of runners.

22. The apparatus of claim 21, the first set of runners further comprising a first set of resistive elements, the second set of runners further comprising a second set of resistive elements.

23. The apparatus of claim 20, further comprising a computing means in communication with the first set of runners and the second set of runners of each bridge.

24. The apparatus of claim 20, the first Wheatstone bridge and the second Wheatstone bridge being fabricated as an integrated circuit.

25. The apparatus of claim 20, further comprising a computing means in communication with the first Wheatstone bridge and the second Wheatstone bridge, the computing means configured to determine the rotational speed and direction of a moving member that is rotating based upon the first bridge signal's relationship to the second bridge signal.

26. The apparatus of claim 25, the computing means being fabricated on the integrated circuit.

27. The apparatus of claim 20, the moving member comprising a magnetic array which further comprises at least a first magnetic orientation and at least a second magnetic orientation.

28. The apparatus of claim 27, the magnetic array configured as a ring magnet.

29. The apparatus of claim 24, the second bridge further comprising a third set of runners and a fourth set of runners, the first set of runners and the second set of runners in the first bridge oriented corresponding to the third set of runners and the fourth set of runners in the second bridge.

30. The apparatus of claim 24, the first bridge being further configured in the same orientation as the second bridge.

31. The apparatus of claim 28, wherein the first and second bridges are placed approximately in a plane parallel to and facing the side of the ring magnet.

32. The apparatus of claim 28, wherein the first and second bridges are placed approximately in a plane parallel to and at the end of the ring magnet.

33. An apparatus to sense the speed of a moving member having a magnetic field, the apparatus comprising:

at least a first set of runners and at least a second set of runners adjacent to the moving member, the first set of runners and the second set of runners configured as a Wheatstone bridge, the Wheatstone bridge configured to generate at least an output signal as the member moves and as a magnetic field associated with the member electrically influences at least one of the first and second set of runners.

34. The apparatus of claim 33, the first set of runners being approximately perpendicular to the second set of runners.

35. The apparatus of claim 34, the first set of runners further comprising a first set of resistive elements, the second set of runners further comprising a second set of resistive elements.

36. The apparatus of claim 33, further comprising a computing means in communication with the first set of runners and the second set of runners of the bridge, wherein the computing means is configured to determine the rotational speed of a moving member.

37. The apparatus of claim 33, the Wheatstone bridge being fabricated as an integrated circuit.

38. The apparatus of claim 33, the moving member comprising a magnetic array ring magnet which further comprises at least a first magnetic orientation and at least a second magnetic orientation.